

Particle Motion Activities

STANDARD 3200-01 Students will evaluate the particulate nature of matter.

OBJECTIVE 3200-0102 Demonstrate the role of motion in the particulate description of matter.

Intended Learning Outcomes:

- 1a. Make observations and measurements.
- 1d. Make estimations and predictions based on observations and current knowledge.
- 2a. Identify variables and describe relationships between them.
- 2b. Formulate research questions and hypotheses.
- 2g. Construct models and simulations to describe and explain natural phenomena.
- 4d. Recognize the personal relevance of science in daily life.

Background:

Be familiar with the particulate nature of matter.

Summary:

1. Students will form hypotheses and observe demonstrations of particle movement.
2. Students will identify variables and describe relationships in simulations of particle movement.



Observations: Place a few drops of milk on a microscope slide. Add a cover slip. Observe the fat globules on medium power of a microscope. Pick a fat globule and stare. What does the motion of the fat globules in two-percent milk look like? What could be causing the globules to vibrate? (This motion is called Brownian motion. The fat globules move because of the motion of the molecules in the milk.)



Problem: How does the temperature of water affect the motion of the food coloring in the water?

Hypothesis: Predict what you think will happen.

Design a Test of your hypothesis:

Materials:

3 - 250 mL beakers, hot plate, stop watches, food coloring, thermometer, hot plate, refrigerator, hot pad, and pipet

Procedure:

1. Place 100 mL of room temperature water into a beaker.
2. Place three drops of food coloring to each beaker.
3. Time how long it takes for the food coloring to diffuse throughout the beaker. Record time.
4. Repeat steps 1-3 for hot water, and for the cold water.

Test of Hypothesis: Make a table on which to record your observations of time for the three temperatures of water. Calculate the average for the other groups in the class.

Analyze Results: Make a bar graph that shows the time it took for each of the three temperatures of water to form a solution of water and food coloring.

Conclusion: Compare your hypothesis with what you observed.

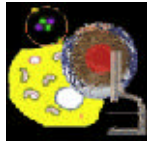
Extension: Try changing other variables like the amount of stirring or water with different substances like salt or sugar dissolved in the water before adding the food coloring.

Safety concerns:



Be sure to keep all Chemical, Heat, and Glassware Safety Rules that are specified by your teacher and in all general laboratory experiences.





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